

Claims

1. A variable lens comprising:
 - a substantial cylindrical fluid chamber (22) including a first, electrically conductive, fluid (40) and a second, non-conductive, fluid (50), the fluids being non-miscible, in contact with each other and having different indices of refraction, and
 - an electrode configuration comprising a first electrode (34) in contact with the first fluid (40) and second electrode means (30,32; 92) arranged at the chamber wall (24), characterized in that
 - a volume of one of the fluids (40) is arranged between two volumes of the other fluid (50), in that
- 15 - the second electrode means comprises at least two sub-electrodes (30,32;92) each covering, in the direction of the cylinder axis, different portions of the cylinder wall and in that
- 20 - the chamber wall is provided with two openings (36,37) at its opposite ends which openings are interconnected by means of an external fluid guide (38) to circulate one of the fluids in and out the chamber.

2. A variable lens as claimed in claim 1, characterized in that the inner wall of the fluid chamber facing the fluids is covered with an insulating layer (48).
- 25 3. A variable lens as claimed in claim 2, characterized in that the insulating layer (48) is hydrophobic.
4. A variable lens as claimed in claim 1, 2 or 3 characterized in that a volume of the first fluid (40) is arranged between volumes of second fluid (50).

5. A variable lens as claimed in claim 1, 2 or 3, characterized in that a volume of the second fluid (50) is arranged between volumes of the first fluid (40).
- 5 6. A variable lens as claimed in claim 5, characterized in that the first electrode (34) is arranged substantially in one of the openings (36; 37) in the chamber wall (24).
- 10 7. A variable lens (90) as claimed in any one of claims 1-6, characterized in that the second electrode means comprises a series of annular electrodes (92).
- 15 8. A variable lens as claimed in any one of claims 1-7 in that the fluids (40,50) are liquids.
9. A variable lens as claimed in claim 8, characterized in that the first liquid (40) is salted water and the second liquid (50) is oil.
10. A variable lens as claimed in any one of claims 1-9, wherein the lens 20 (20) is a zoom lens.
11. An image-capturing device (100) comprising a lens system (102) and an image-receiving unit (112), characterized in that the lens system (102) comprises a variable lens as claimed in any one of claims 1-9.
- 25 12. A camera comprising an image-capturing device (100) as claimed in claim 11.
13. A camera as claimed in claim 12, wherein the lens system (102) is a 30 zoom lens system.

14. A hand-held apparatus (120) comprising a camera as claimed in claim 12 or 13.

15. A hand-held apparatus wherein the apparatus is a mobile phone (120).

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16. An optical device (160) for scanning an information layer (154) and comprising a radiation source unit (162) for supplying a scanning beam (164, 170, 172) an optical lens system (168, 172) for focusing the scanning beam to a scanning spot (178) in the information layer and a radiation-sensitive detection 10 unit (186) for converting scanning beam radiation from the information layer in electrical signals (188), characterized in that the lens system comprises a variable lens (20; 80; 90) as claimed in any one of claims 1-9.

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17. An optical device as claimed in claim 16 for scanning at least two information layers (154) at different depths in one record carrier 9150) and comprising an objective lens system (174) and a collimator lens system (172), characterized in that the variable lens (20; 80) is included in the collimator lens system to correct for spherical aberrations introduced by the different depths of the information layers.

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18. An optical device as claimed in claim 16 for scanning at least two information layers (154) of different format, wherein the radiation source unit (162) is switchable to emit at least two beams (164) of different wavelengths and wherein the lens system comprises an objective lens system (174), 25 characterized in that the variable lens (20; 80; 90) is included in the objective lens system (174) to adapt this system for the different formats of the information layers (154).